License Plate Aging and Visibility Risk Factors

License plates are subject to some of the harshest environmental conditions: Road salts, chemicals, petroleum spatter, high wind speed, extreme temperatures, UV radiation, humidity, and debris impact, to name a few.

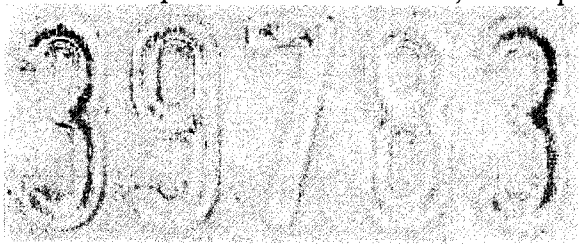
The standard comprehensive warranty offered by a manufacturer covers license plate sheeting performance for a period of five years. After this period, it is recommended to replace the license plate in order to maintain performance characteristics. White sheeting, for example, has a specified brightness level of retro-reflectivity which must be maintained during the warranty period. In general practice, it is expected that within the first five years, the sheeting will still maintain about 50-80% of its original retro-reflectivity levels. Further **accelerated retro-reflectivity drops are expected after the first five years and may represent significant losses and reduced night visibility for law enforcement.** Environmental conditions will further diminish the retro-reflectivity, legibility and general appearance of the license plate. In addition to normal retro-reflectivity loss over time, various degradation modes of license plates have been observed.

Although the failure modes MAY NOT be typical for every state, they represent actual performance risk factors AFTER the manufacturer's warranty period. Some of these failure modes can occur anytime in the lifetime of a license plate, but the longer a plate is in service, the greater the probability a failure mode will occur. That's why it is recommended to replace license plates every 5 years to minimize such risk.

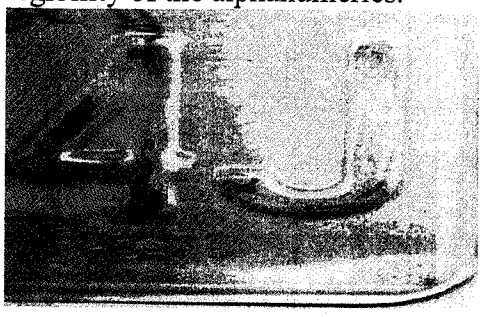
After the warranty period license plates MAY experience:

1. **Mechanical Damage:** This is perhaps the most common failure mode and includes damage due to impact of road debris and of the vehicle hitting curbs, other vehicles, etc. It is common for these damage sites to have reduced brightness.

2. **Roll Coat Adhesion Loss:** This is where the roll coat inks may flake off the embossed alphanumerics over time, due to physical forces.

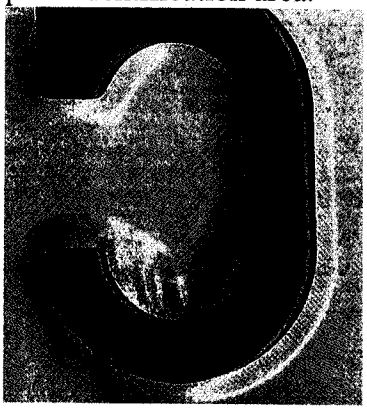


3. **Fading:** This includes the effects of UV radiation on colors which affect the legibility of the alphanumerics.

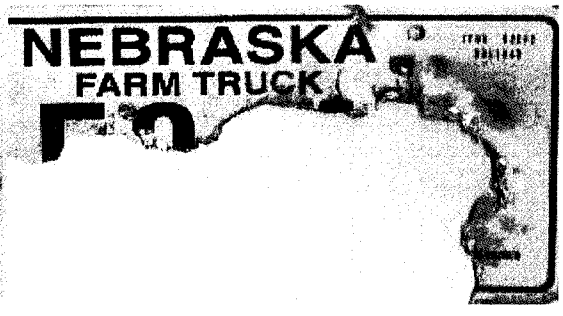


4. **Brightness Loss:** This is a gradual process inherent in the sheeting and may become very noticeable after five years. **50%** or more of brightness loss after 5 years can be expected and visibility loss is accelerated after 5 years.

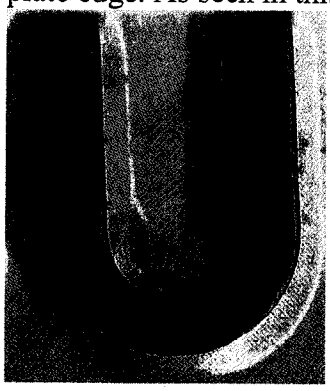
5. **Bubbling:** Process where the outer layer is infiltrated by air/water and freeze/thaw cycles, causing uplifting of the protective topfilm and visibility impairment of the plate identification area.

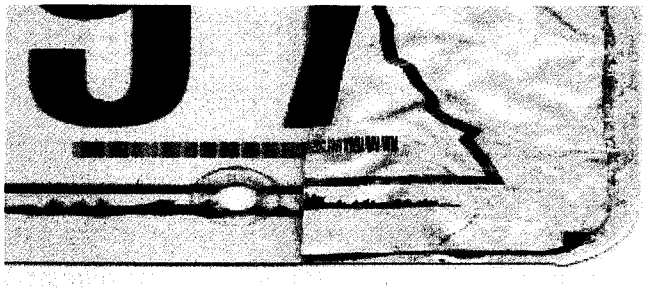


6. **Corrosion:** Metal substrates are subject to salts and other chemicals which are corrosive.



7. **Sheeting Delamination or Edge Lifting:** Process where the sheeting is infiltrated by air/water and freeze/thaw cycles, causing uplifting of sheeting and visibility impairment of the plate identification area. This infiltration may also occur at the plate edge. As seen in this picture, sometimes the sheeting will break off.





8. **Metal Fatigue:** Substrates (aluminum or steel), can break or crack due to continuous vehicle vibration, debris impact, and less costly, thin metal blanks.